

Governor's Task Force on Information Technology in Health Care
Subcommittee #3 EHR in Hospitals and Institutions
Interim Report - September 2005

I. Task Force Charge

The key component of the Task Force's charge articulated in Governor Warner's Executive Order was:

“Initiating a plan for the development and implementation of a Virginia health information infrastructure, consistent with and complementary to developing national standards, that promote greater adoption of electronic health record information systems among all health care providers (including interoperability standards and mechanisms that allow current systems to share information with patients and other authorized users).”

II. Subcommittee #3

Subcommittee #3 was tasked with focusing on the status of EHR development in health care institutions today and where it could or should be in the future. The subcommittee defined institutions broadly to include hospitals and health systems, long term care providers, health plans (both in terms of their own EMR/EHR initiatives and incentives provided for others) and the public mental health facilities. The subcommittee also focused on the degree of interoperability among health care institution EHR/EMR systems, where interoperability was defined as “the ability of different information technology systems and software applications to communicate, to exchange data accurately, effectively and consistently, and to use the information that has been exchanged.” (This is a consensus definition of the term accepted by a broad cross-section of the health care sector and developed under the auspices of the National Alliance for Health Information Technology).

III. EMR Development Within Virginia Healthcare Institutions

Drawing from recent national surveys and recent state efforts, the subcommittee collected and analyzed a variety of information about the current stage of EHR/EMR development among health care institutions, what barriers existed and anticipated progress. Current results for three of the major health care facility categories follow. The health plan picture is incomplete, but more information from a national survey of health plans will be available later this year and will be submitted to the Task Force at that time. The subcommittee opted to defer examination of public mental health system issues until Phase 2 of the Task Force's work plan.

A. Hospitals and Health Systems

Hospital adoption of information technology has been promoted as saving time, human and financial resources and patient lives. To understand the rate and issues in adopting information technologies (IT) - such as electronic health records (EHR) and computerized physician order entry systems (CPOE), as well as connectivity with others

in the health care community and barriers to IT adoption - 53 Virginia hospitals and health systems completed a recent American Hospital Association survey.

Responding organizations represent slightly more than three-quarter of the Virginia hospital market. VHHA analyzed the Virginia responses according to hospital size and system affiliation pursuant to subcommittee queries. Analysis of the results is provided below and more detail is included in Appendix 1.

Sample

Two separate analyses were done. Sample A: Hospitals were separated in to 3 groups based on revenues. Group 1 (N=7) has revenues over 300 million dollars. Group 2 (N=19) has revenues between 100 million and 300 million. Group 3 (N=27) has revenues less than 100 million. Together the hospitals represent 76% of net revenue for 2003 (EPICS). Sample B: Hospitals were grouped based on their affiliation with a multi-hospital state or national health system. There were 41 hospitals assigned to the system group and 11 hospitals assigned to the non-system group. One submission of data was excluded because upon further research it was found not to admit acute care patients.

Findings

Information technology appears to be well accepted and used in all non-clinical areas. Patient scheduling systems lag behind other systems but are still widely used by in Virginia's facilities. This finding is consistent regardless of grouping by revenue or system affiliation.

The clinical side of the hospital has not yet uniformly adopted IT systems, but only one hospital out of the 53 is not actively considering, testing or using IT for clinical purposes. This facility is a long-term care, skilled nursing facility. This facility was excluded from system/non-system analysis.

Interestingly, few organizations are in a testing phase with any one health information technology. For the most part they have either partially or fully adopted the technology or are considering adopting it in three years.

Bar coding

The largest hospitals are the furthest along in implementing bar coding for patient identification. Five of the seven hospitals in this group have fully implemented bar coding for this purpose and a sixth hospital has partially implemented the system. The seventh hospital expects to have it implemented in three years.

About half the hospitals in Group 2 have fully implemented bar coding for patient identification. One hospital in this group currently has no plans to implement the technology, but the others expect to have it in place in three years. In Group 3, three facilities have no plans to implement. The other 24 hospitals have either implemented it or are planning to implement bar coding systems in three years.

Today, bar coding is most likely to be used to manage specimens in hospital laboratories. Going forward, it will become more commonplace in pharmaceutical tracking and

administration. The area least likely to see this technology fully implemented is supply chain management. This is unusual given the uniform use of bar coding by material management vendors.

Adoption of bar coding is further along in non-system hospitals for purposes of identifying lab specimens, tracking pharmaceuticals, and supply chain management (materials management functions). System hospitals have been more successful in implementing bar coding for patient identification and pharmaceutical administration (patient care functions). The non-system hospitals are more likely to consider not adopting bar coding for a specific purpose than system hospitals.

Other information technologies

Telemedicine and physician use of personal data assistants have been adopted by most large and medium sized hospitals. Small hospitals are likely to adopt telemedicine first followed by use of a personal data assistant. Radio frequency identification is being used by only a small number of medium size hospitals. Group1 and Group 3 have not adopted it at all.

System hospitals expect to have telemedicine and physician personal data assistants available in 100% of the facilities within three years. None of the three technologies will be implemented by 100% of the nonsystem hospitals.

Electronic Health Records

Hospital adoption of EHR technology appears to stimulate the records being available in other areas of the enterprise. Hospital, emergency department and pharmacy service records are most likely to be linked electronically in all hospitals within three years. The Group 1 hospitals have already completed this process. Group 1 hospitals have either implemented electronic health records in the additional patient areas or are in the process of doing so. A small percentage of Group 2 hospitals have no plans to link patient records outside of hospital inpatient, emergency department and pharmacy services.

Specific findings within the groups with regard to access, order entry and results review:

Access to current medical records (observations, orders), medical history, patient flow sheets, patient demographics, clinical guidelines or pathways, picture archiving and communications

Hospitals have either completed implementing IT systems to **access** information about or for patients or are in the process of implementing them. Size appears to influence speed of adoption. Group 1 hospitals are more likely to have fully IT these areas with the exception of patient flow sheets. In the areas of medical records and patient demographics, the hospitals in Group 2 hospitals are close to completing adoption. In the Group 3 hospitals, IT is most likely to be applied to access to medical histories and patient demographics and least likely to link patient care with patient guidelines and pathways.

When the hospitals are grouped by system status, there is no clear picture that affiliation imparts a benefit for adopting information technologies that address access to medical

records, medical history, patient flow sheets, patient demographics, clinical guidelines or picture archiving and communications. What is clear is that these modalities are being rapidly adopted by all hospitals.

Order entry of lab, radiology and pharmacy orders:

These systems have been fully adopted by the majority of hospitals. Based on the responses, one could predict 100% hospitals in the group to have them operational in 3 years. Unlike the system hospitals, all non-system hospitals have completed implementing order entry of lab and radiology orders. However, system hospitals will complete implementing order entry pharmacy first.

Results review of consultant, lab, radiology, radiology image and other tests:

Group 1 hospitals have fully implemented IT in these areas. Only in Group 3 are there hospitals that are not planning to have all the report functions implemented in three years.

Non-system hospitals have completed implementing IT systems for results review of lab tests and radiology test and over half of the facilities have completed implementing links to radiology imaging reports. They lag behind the system hospitals in results review technology for consultant reports, radiology images and other studies. This finding is not surprising given that the non-system hospitals have already completed order entry of lab and radiology orders.

Patient support through home-monitoring, self testing, and interactive patient education:

While all the Group 1 and 2 hospitals could be expected to have patient support systems up and running in three years, this cannot be said of hospitals in Group 3 as 42% of them have no plans for adopting the patient support systems listed. System affiliation does not appear to enhance the likelihood that a hospital will adopt IT for patient support.

Overall EMR Results

The findings indicate that most components of electronic health records are being rapidly adopted by all hospitals regardless of system ownership. Such records are common now in hospitals, emergency departments, and pharmacies. System membership appears to speed adoption of electronic health records in onsite and offsite clinics, onsite and offsite physician offices and other remote locations.

CPOE

CPOE has received a lot of press in the lay and professional literature about its contribution to patient safety. Its adoption appears to be lag behind that of electronic medical records. This may indicate that the organizations choose first to automate the care and tracking of inpatient and emergency room care, before turning to transforming the physician ordering process. The Group 1 hospitals are further along in CPOE adoption. For the most part, Group 2 and 3 hospitals are postponing adopting these systems for 3 years.

Non-system hospitals appear to focus their efforts to implement CPOE in areas of pharmacy, lab and radiology ordering. This is consistent with the approach to bar coding

described earlier. Likewise, access to CPOE to automate and standardize the clinical ordering process to eliminate illegible, incomplete and confusing orders may be occurring more quickly in non-system facilities for inpatient services, emergency department and pharmacy. Over time, however, more systems facilities will adopt the technology, particularly in areas that are not treating inpatients, as the intent to adopt the technology outside inpatient areas is not being considered by some non-system hospitals.

Stand alone systems

Stand alone systems are neither plentiful nor uniformly integrated regardless of size or affiliation. However, the effect of system hospitals is that standalone information technology is more likely to be used and for it to be integrated with other hospital IT system.

Stand alone systems are most likely to be found in the catheterization and picture archiving and communications units. They are also the areas most likely to have integrated their systems with others in the hospital. The smallest hospitals are most likely to have Emergency Department stand alone IT and for it to be integrated with other hospital systems.

Information sharing with entities outside the hospital or health system

Sharing of patient information is not uncommon outside a hospital but size and system affiliation have an effect on to degree to which is occurs and with whom information is shared. Larger hospitals and system hospitals are more likely to have information sharing with outside entities. No hospital shares information with a school clinic. More Group 2 and 3 hospitals share patient data with retail pharmacies than largest facilities do. The lack of sharing among entities that influence types of care or payment may indicate where the options are for developing RHIOs. When grouped by hospital size, the responses indicate private physicians, free standing image centers and long-term care facilities are most likely to have electronic access to hospital patient information.

Barriers to implementation of IT

Cost and problems with interoperability are significant barriers for Group 3 hospitals. Three factors that do not hinder any hospital's adopting information technology are: fear of obsolescence, legal barriers, and HIPAA compliance. Over half of all the hospitals consider the ability to support ongoing costs of hardware and software somewhat problematic. The ability to hire well-trained IT staff while somewhat problematic is not a significant deterrent for any hospital. A small number of hospitals in each group consider clinician acceptance of technology as a significant barrier to its adoption.

When the hospitals are grouped by system affiliation, the only clear finding is that the order of difficulty that barriers pose is consistent between the two groups. System hospitals may be more concerned about inability of technology to meet their needs, obsolescence, and acceptance of new technologies by clinical staff. With more than one hospital to manage, the degree of control over these factors may be more problematic for systems.

Summary of Hospital Results

Information technologies are already the norm in non-clinical areas of hospitals and quickly becoming the norm for clinical areas as well. Computerized physician order entry lags behind electronic patient information, but most hospitals have made significant headway in its implementation.

While detail results from other states are not yet available, one general result is that Virginia respondents seem to be well ahead of national norms in terms of the pace and scope of hospital IT, EMR and CPOE system adoption. This may be attributable to the relatively high level of system consolidation within Virginia hospitals.

Most hospitals participate in some local and regional patient data sharing arrangements, but the data sharing arrangements outside the hospital are not plentiful. Two factors, larger size and being part of a multi-hospital system, are associated with the presence of data sharing and doing so with more partners.

B. Health Plans

In general, health plans are committed to a system that can assure greater patient safety, improved quality and increased efficiency through the increased use of electronic health records. There is a broad understanding by health plans of the benefits and value of broader health care IT development. For example, integrated delivery system-model health plans (e.g., Kaiser and Sentara) are utilizing sophisticated information management systems that will enhance the quality of patient care. Moreover, Anthem is utilizing incentives for provider adoption of certain IT tools tied to patient safety and quality outcomes built into its “Quality-In-Sights: Hospital Incentive Program” (Q-HIP). Anthem is also leveraging health care IT in its Anthem Point of Care program and its Model Provider Office pilot.

Kaiser

Mr. Ken Hunter, Chief Administrative Officer of Kaiser Mid-Atlantic, provided a thorough review of Kaiser’s current Electronic Medical Record (EMR) initiative, including the basic capabilities, resources and timing of Kaiser’s multi-year EMR effort – both in this region and nationally. Questions and discussion focused on the mechanisms for linkages with contracting providers, as well as the planned utilities for patients/enrollees. Mr. Hunter also described the emphasis Kaiser was placing on ensuring adequate physician and staff input and training along the path toward full implementation.

The EMR programs of organizations like Kaiser and Sentara – which encompass the health plan and much of the delivery system under a single organizational roof – offer a glimpse of what a fully functional electronic health record might include. For this reason, a summary of Kaiser’s program is incorporated below. Sentara’s EMR/EHR initiative is moving along a similar trajectory:

The Kaiser Permanente HealthConnect program integrates the clinical record with appointments, registration and billing to deliver improvements in care delivery and patient satisfaction across the Kaiser Permanente organization.

Key points about KP HealthConnect:

- **Privacy of information** is a top priority in designing and implementing KP HealthConnect. The design of the software ensures that sensitive medical information will be protected.
- **Patient Safety** will be enhanced by KP HealthConnect. Drug interactions and allergic reactions will be prevented by software that knows what medications the patient is taking and checks for conflicts. A patient's medical history will be available to every clinician who is involved in that patient's care--at the same time--even if the doctor is in Georgia, a nurse is in Colorado, and the specialist is in California.
- **Relationships and personal care** will be honored and enhanced by KP HealthConnect. One of the key goals of the project is to free up doctors' and nurses' time to spend with patients rather than on paperwork. Our own studies have already found that, for instance, having a computer in the exam room enhances communication between the doctor and patient.
- KP HealthConnect will help us protect the health of members of Kaiser Permanente. **Prevention and wellness** will be facilitated by the system; it will keep track of each patient's preventive care needs--checkups, follow-ups--and remind patients and their doctors when a screening is needed. Doctors, nurses and other caregivers will have the latest research, best information and tools available to care for their patients.
- Members will be able to **access their information online** and take care of medical needs online when KP HealthConnect is fully implemented. The first region to have online patient access will go live in late summer 2005. Kaiser Permanente members will be able to go online to <http://www.kp.org> to make appointments, view lab test results, refill prescriptions, view prescription histories, and communicate with their doctors and other health care providers online. A Kaiser Permanente patient will be able to see a history of visits with their doctor, even the diagnosis at each visit and recommended next steps for themselves and their self-care.

Anthem

Q-HIP: At Anthem Blue Cross and Blue Shield, a focus on EHR is an important component of its new hospital incentive program. The Quality Insights Hospital Incentive Program (Q-HIP) promotes use of Computerized Physician Order Entry (CPOE) systems following the Leapfrog guidelines. CPOE is an integral part of a facility EHR and through the stepwise approach in QHIP, Anthem rewards hospitals for developing a business plan and then for successfully moving through the necessary prerequisites culminating in full CPOE implementation.

Anthem Point of Care: Anthem Point of Care puts internet technology to work, providing a Web-based link between Anthem and its network-participating providers. With over 14,000 registered providers, Point of Care has evolved based on valuable input from providers, earning a proven track record. This electronic service helps ease the administrative workload of office staff by allowing them to perform administrative tasks quickly and easily -- including claims status inquiries, referrals and adjustments -- saving time and resources.

Point of Care offers a broad array of features, allowing secure access to the following:

- Eligibility and Benefits (Including effective and cancellation dates for prior coverage information, patient's primary care information and benefits such as deductibles and co-payments.)
- Claims Status (Includes 24 months of patient history with a line-by-line breakdown of claims processing information and an electronic link to submit adjustment requests.)
- Authorization Functions [Provides options to view, create and update specialty care reviews (referrals), inpatient admissions (pre-certification for inpatient stays) and health services reviews (outpatient pre-authorizations).] In addition, you can use these features to determine whether an outpatient authorization is recommended based on the procedure and the member's contract.
- eReports (Includes weekly remittance vouchers with the capability to view prior vouchers for the past 24 months and HMO and Point of Service primary care physician reports.)
- Links to Maximizing Electronic Commerce (claim submission, electronic payment, eligibility verification, etc.), Anthem's Web site (www.anthem.com) and the Anthem Professional Forum (monthly provider newsletter).

Model Provider Office Pilots: Finally, Anthem Blue Cross and Blue Shield has partnered with three large hospitals and one large physician practice to pilot an initiative to improve business operations and customer service by creating faster and more accurate claim

payments, reducing billing rework and enabling correct copay collection at the time of service for the member. The project focuses on delivering eligibility and benefits information directly into the providers' health information system giving the provider the opportunity to deliver a cleaner electronic claim submission. In addition, the solution gives the provider the ability to correct claims pre and post submission.

AHIP – America's Health Insurance Plans

Finally, America's Health Insurance Plans (AHIP) is putting together a new report on health information technology called "Innovations in Health IT," which will provide a broad overview of recent IT initiatives by health plans, including work related to electronic health records. The report should be available later this fall and will be supplied to the Task Force as soon as it has been released.

C. Long Term Care

Virginia's nursing facilities, like their counterparts around the country, are just now beginning to seriously undertake efforts to implement information technology (IT) resources beyond those associated with basic financial management.

The recent growth in clinical IT capabilities for nursing facility providers can be largely attributed to federal requirements that took effect in the late 1990s. Regulations developed as a result of the 1987 Omnibus Budget Reconciliation Act (OBRA '87) require facilities to provide services to meet "the highest practicable physical, medical and psychological well-being" of every resident. The medical regimen must be consistent with the resident's assessment and performed utilizing a uniform instrument known as the Minimum Data Set (MDS). The MDS collects assessment information on each resident's characteristics, activities of daily living, medical needs, mental status, therapy use, and other things involved in comprehensive planning for resident care.

In an attempt to gather basic baseline data related to the recent and planned investment in IT resources by Virginia's nursing facilities, the Virginia Health Care Association (VHCA) conducted a brief survey of its members. A summary of the survey results are included in Appendix 2.

Information provided by responses from VHCA members representing nearly 50% of all Virginia nursing facility beds indicates significant IT implementation activities in a number of clinical areas including care planning, MDS assessment and submission, dietary management, quality assurance and therapy management. However, less than 15% of Virginia nursing facilities are actively using, implementing or testing EHR resources and applications. On an encouraging note, over 60% of nursing facilities responded that they are considering the implementation of EHR resources over the next three years.

The VHCA survey also appears to confirm a long-held concern that for the vast majority of the Commonwealth's nursing facilities, the high cost of IT investment combined with

insufficient Medicaid payment, serves as a significant barrier to higher rates of IT adoption.

III. Findings and Recommendations

Rapid progress within hospital and health systems in terms of EMR systems, even relative to other states, was a very positive finding. Also positive is the broad recognition among health plans of the value of wider health care IT development, the impressive “smart” EMR capabilities being implemented by integrated delivery system-model health plans (e.g., Kaiser and Sentara) and the incentives for provider adoption of certain IT tools tied to patient safety and quality outcomes built into Anthem’s Q-HIP program. In certain cases, these EMR tools are also being extended to affiliated providers in the community, especially with health systems that include large physician practice components.

Less positive, but not at all surprising, was the relatively limited progress made toward ensuring the interoperability of these systems across sectors and regions – although the MedVirginia Richmond initiative offered some promise in this area. The cost of IT systems remains a barrier for smaller hospitals and most nursing homes.

The subcommittee research and resulting discussions focused on various strategies the state and significant private stakeholders could employ to advance health care IT/EMR development and interoperability. It was generally agreed by the group that the vast majority of health care is delivered locally or regionally, so that regional EMR and data-sharing initiatives should be the locus for most IT data-sharing initiatives. The specific organizational structure and focus for such regional health care information organizations (commonly referred to as RHIOs) can and should vary.

The current federal policy environment, the nature of many Virginia health care markets (e.g., strong regional systems), state level capabilities and initiatives and the results of the subcommittee’s research all point to an environment that is ripe for collaborative initiatives that build IT bridges that connect disparate components of an electronic health record and advance common quality, health improvement and efficiency goals. But with the important exceptions of regional efforts underway in Richmond and in the Southwest, there is little in the way of cross-sector or community-wide health care data linkage initiatives in the Commonwealth.

A. Near Term Recommendations

A spark or catalyst is needed to accelerate development of the health care information infrastructure envisioned in the Task Force’s charge. To provide this catalyst, especially with regard to interoperability of health care institution EMR systems, the subcommittee recommends that the full Task Force, Governor and Legislature provide financial and technical assistance, with matching federal and stakeholder resources, towards the formation and evolution of regional health care information-exchange organizations (RHIOs) in the Commonwealth that: a) involve provider organizations, health plans,

employers, and public partners; b) operate in a manner consistent with emerging federal standards and certification processes; and c) establish secure, reliable and sustainable mechanisms for the transmission and use of electronic health record information systems among patients, health care providers and other authorized users. In order to better ensure patient privacy, the subcommittee also recommends that any state-supported RHIOs operate in a manner that serves as a hub or connector among existing electronic health record systems, rather than as a central repository for patient identified information. Additionally, a hub solution would also likely be much easier and less costly to deploy than one or more large data repositories.

The subcommittee further recommends that the Task Force, Governor and Legislature specifically task one or more of such RHIOs with the following in the near term:

1. Taking primary responsibility for designing and maintaining a master patient index system (for use by the Commonwealth with the immunization data base and as a tool that supports other regional initiatives);
2. Ensuring that medication data and histories can be shared in real-time with authorized users (e.g. emergency physicians) in a fashion that:
 - a. Fully complies with state and federal privacy standards;
 - b. Includes Medicaid and state-employee data;
 - c. Shares existing medication information from health plan, pharmacy and other medication sources;
 - d. Ties to regional and health system EMR systems so that practitioners at the site of care have access to more complete medication histories;
 - e. And supports e-prescribing systems and tools.

Each of these items - designing a secure and reliable methodology for properly linking health care information with specific individuals and linking existing medication information to patient-authorized users – are top priorities of an effective health care information infrastructure. Commonwealth leadership in this area could significantly accelerate the scope and pace of EMR development for all populations.

The Commonwealth has a particular policy interest in MPI systems for ensuring patient privacy, security and reliability of the information. It also has some experience within the Health Department as part of developing and maintaining the immunization registry.

Concerning medications the state also has a particular interest in its purchaser role since Medicaid is a major insurer for those with chronic diseases whose treatment often requires multiple prescriptions. To the extent that accurate medication histories could be drawn from existing health plan and other data sources, and shared in real-time with authorized providers, complications can be avoided, care quality and cost-effectiveness can be enhanced.

The final near term recommendation from the subcommittee is to support expanded collection of ED treatment data for public health purposes by:

1. Broadening participation in current ESSENCE system among hospital emergency rooms;
2. Making submissions more timely and efficient via standardized and routine electronic reporting systems (e.g., North Carolina);
3. Incorporating feedback loops and systems so that authorized personnel (ED directors, regional emergency medical coordinators, emergency physicians) receive key “dashboard” results; and
4. Extending reporting fields as necessary for public health and preparedness purposes.

The Commonwealth has a compelling public health need to be better prepared to monitor and respond to disease outbreaks, regardless of origin. Clinically driven and scientifically sound syndromic surveillance systems, with hospital emergency departments a key contributor, are being piloted in other states and in parts of the Commonwealth. The subcommittee recommends expansion of these initiatives with input from an expert advisory body and under the auspices of the Virginia Department of Health.

B. Longer Term Recommendations

In addition to the above initial priorities, the subcommittee discussed longer term goals with regard to interoperability of health care institution EMR systems. Impediments to universal EMR system adoption and interoperability are well addressed elsewhere, although there is cause for cautious optimism that national certification and standardization efforts will address some of these technical impediments in the near term.

But as the subcommittee’s survey results show, costs of these systems are also an impediment to full IT development for smaller hospitals and are a significant barrier for most long term care facilities.

However, if a) sufficient incentives and supports from public and private payers are provided to overcome the cost limitations, and b) state and federal interoperability standards are promulgated and incorporated by the vendor community, the subcommittee believes that acute health care institutions can be expected to have fully interoperable EMR systems in place within five years. Interoperable hospital EMR systems within five years would mean that a patient transferred from one hospital to another will have their hospital diagnosis and treatment information go with them and that this information could be used and applied by the receiving organization.

Longer-term goals with regard to the public mental health system and long term care sectors must await further information gathering in Phase II of the Task Forces work.

Appendix 1

Virginia Hospital IT Adoption

Sample: Sample consists of 53 hospitals. Hospitals were separated in to 3 groups based on revenues. Group 1 (N=7) has revenues over 300 million dollars. Group 2 (N=19) has revenues between 100 million and 300 million. Group 3 (N=27) has revenues less than 100 million. Together the hospitals represent 76% of net revenue for 2003 (EPICS).

Part I. Have you adopted IT in the following non-clinical areas?

Patient accounts department--% reporting yes

Group1	100%
Group 2	100%
Group 3	96%

Patient scheduling systems --% reporting yes

Group1	86%
Group 2	84%
Group 3	78%

Pharmaceuticals supply chain management --% reporting yes

Group1	100%
Group 2	100%
Group 3	93%

Medical-surgical supply chain management --% reporting yes

Group1	100%
Group 2	89%
Group 3	93%

Summary: Information technology has been adopted in all non-clinical areas to a large degree. Patient scheduling systems lag behind other systems but are still widely used by in Virginia's facilities.

Are you actively considering, testing or using any IT for clinical purposes? (example: EHR, CPOE, telemedicine, pharmacy and laboratory systems)-- % reporting Yes

Group1	100%
Group 2	100%
Group 3	96%

Summary: Only one hospital out the 53 is not actively considering, testing or using IT for clinical purposes. This facility is a long-term care, skilled nursing facility.

Part II. HIT systems implemented or being considered at your hospital.

The analysis gives the two most common answers (greater than 50% response for the choice of options). Options are:

- Partially or fully implemented
- Testing

- Considering implementing in next 3 yrs
- Not in place & not considering implementing

“Partially or fully implemented” indicates commitment of time, money, training and ongoing resources. “Testing” indicates actively investigating a system and determining its “fit” with the organization. “Considering implementing in the next three years” indicates not commitment at the present time but interest exists. “No plan” indicates no interest in adopting the health information technology listed. Of note was the finding that few organizations are in a testing phase with any one health information technology. For the most part they have either partially or fully adopted the technology or are considering adopting it in three years.

Use of bar coding for:

a. laboratory specimens

Group 1	86% part or fully implemented	14% considering implementing in 3 yrs
Group 2	68% part or fully implemented	26% considering implementing in 3 yrs
Group 3	48% part or fully implemented	19% not considering

Group 1 split between the two options listed.

Group 3 is the only group that reported not considering bar coding for lab specimens

b. tracking pharmaceuticals

Group 1	57% part or fully implemented	43% considering implementing in 3 yrs
Group 2	53% considering implement in 3 yrs	47% part or fully implemented
Group 3	52% part or fully implemented	33% considering implement in 3 yrs

Groups 1 & 2 split between the two options listed.

c. pharmaceutical administration

Group 1	71% considering implement in 3 yrs	29% part or fully implemented
Group 2	68% considering implement in 3 yrs	26% part or fully implemented
Group 3	48% part or fully implemented	33% considering implement in 3 yrs

Group 1 split between the two options listed.

Group 3 has more implementation than Group 2 does.

d. supply chain management

Group 1	57% part or fully implemented	29% not considering
Group 2	53% considering implement in 3 yrs	47% part or fully implemented
Group 3	63% part or fully implemented	26% not considering

Groups 1 and 2 have % not considering bar coding for supply chain management

e. patient ID

Group 1	57% part or fully implemented	43% considering implement in 3 yrs
Group 2	47% part or fully implemented	47% considering implement in 3 yrs
Group 3	52% part or fully implemented	33% considering implement in 3 yrs

Group1 only group likely to have 100% patient bar coding in 3 years.

Summary: The largest hospitals are the furthest along in implementing bar coding for patient identification. Five of the seven hospitals in this group have fully implemented bar coding for identifying patients and a sixth hospital has partially implemented the system. The seventh hospital expects to have it implemented in three years. About half the hospitals in Group 2 have fully implemented bar coding for patient identification. One hospital in this group currently has no plans to implement the technology the others expect to have it in place in three years. In Group 3, three facilities have no plans to implement. The other 24 hospitals have either implemented it or are planning to do so in three years.

Today, bar coding is most likely to be used to manage specimens in hospital laboratories. Going forward, it will probably become more commonplace in pharmaceutical tracking and administration. The area least likely to see full implementation is in the area of supply chain management. This is perhaps unusual given the uniform use of bar coding by material management vendors.

Use of other information technology:

- a. Use of Telemedicine
- b. Use of Radio Frequency ID
- c. Physician Use of Personal Data Assistant

Definitions:

Telemedicine: The use of medical information exchanged from one site to another using electronic communications for the health and education of patients or providers and to improve patient care.

Radio Frequency Identification (RFID): RFID consists of a tag, which is made up of a microchip with a coiled antenna, and an interrogator or reader with an antenna. The reader sends out electromagnetic waves that form a magnetic field when they "couple" with the antenna on the RFID tag. A passive RFID tag draws power from this magnetic field and uses it to power the microchip's circuits. The chip then modulates the waves that the tag sends back to the reader and the reader converts the new waves into digital data.

Personal Digital Assistant: A term used to describe computers small enough to fit in the palm of your hand and provide computing and data storage abilities.

a. Use of Telemedicine

Group I	100% part or fully implemented	
Group 2	63% part or fully implemented	32% considering implement in 3 yrs
Group 3	67% part or fully implemented	19% considering implement in 3 yrs

No testing in any hospital

b. Use of Radio Frequency ID

Group I	100% consider in 3 years	
Group 2	74% consider implement in 3yrs	11% part or fully implemented
Group 3	59% consider implement in 3yrs	33% no plan

No testing in any hospital

c. Physician Use of Personal Data Assistant

Group I	100% part or fully implemented	
Group 2	63% part or fully implemented	22% considering implement in 3 yrs
Group 3	37% considering implement in 3 yrs	33% part or fully implemented

No testing in any hospital

Summary: Telemedicine and physician use of personal data assistants have been adopted by most large and medium sized hospitals. Small hospitals are likely to adopt telemedicine first followed by use of a

personal data assistant. Radio frequency identification is being used by only a small number of medium size hospitals. Group1 and Group 3 have not adopted it at all.

Use of EHR functions (Electronic Health Record: Electronically originated and maintained clinical health information, derived from multiple sources, about an individual's health status and healthcare. An EHR replaces the paper medical record as the primary source of patient information.):

a. Access to current medical records (observations, orders)

Group I	100% part or fully implemented	
Group 2	95% part or fully implemented	5% considering implement in 3 yrs
Group 3	81% part or fully implemented	19% considering implement in 3 yrs

No testing in any hospital

b. Access to medical history

Group I	100% part or fully implemented	
Group 2	63% part or fully implemented	22% considering implement in 3 yrs
Group 3	89% part or fully implemented	11% considering implement in 3 yrs

No testing in any hospital

c. Access to patient flow sheets

Group I	86% part or fully implemented	14% testing
Group 2	63% part or fully implemented	22% considering implement in 3 yrs
Group 3	77% part or fully implemented	23% considering implement in 3 yrs

d. Access to patient demographics

Group I	100% fully implemented	
Group 2	95% part or fully implemented	5% considering implement in 3 yrs
Group 3	89% part or fully implemented	11% considering implement in 3 yrs

No testing in any hospital

e. Clinical – guidelines and pathways

Group I	100% part or fully implemented	
Group 2	68% part or fully implemented	15% considering implement in 3 yrs
Group 3	37% considering implement in 3 yrs	33% part or fully implemented

No testing in any hospital

f. Access to Picture Archiving and Communications (PACs)

Group I	100% fully implemented	
Group 2	68% part or fully implemented	11% considering implement in 3 yrs
Group 3	54 % part or fully implemented	23 % part or fully implemented

g Order entry – Lab

Group I	100% fully implemented	
Group 2	100% part or fully implemented	
Group 3	96% part or fully implemented	4% considering implement in 3 yrs

No testing in any hospital; 80% Group 3 **fully** implemented

h. Order entry: Radiology

Group I	100% fully implemented	
Group 2	100% part or fully implemented	
Group 3	96% part or fully implemented	4% considering implement in 3 yrs

No testing in any hospital; 80% Group 3 **fully** implemented

i. Order entry: Pharmacy

Group 1	100% fully implemented	
Group 2	84% part or fully implemented	16% considering implement in 3 yrs
Group 3	89% part or fully implemented	11% considering implement in 3 yrs

j. Results review: Consultant report

Group 1	100% fully implemented	
Group 2	90% part or fully implemented	10% considering implement in 3 yrs
Group 3	92% part or fully implemented	8% considering implement in 3 yrs

No testing in any hospital

k. Results review – Lab

Group 1	100% fully implemented	
Group 2	100% part or fully implemented	
Group 3	100% part or fully implemented	

l. Results review Radiology report

Group 1	100% fully implemented	
Group 2	100% fully implemented	
Group 3	96% part or fully implemented	4% considering implement in 3 yrs

No testing in any hospital

m. Results review - Radiology images

Group 1	100% fully implemented	
Group 2	79% part or fully implemented	11% testing
Group 3	69% part or fully implemented	15% considering implement in 3 yrs

n. Results review – Other

Group 1	100% fully implemented	
Group 2	95% part or fully implemented	5% considering implement in 3 yrs
Group 3	85% part or fully implemented	7% considering/ 7% no plans

No testing in any hospital

o. Patient support through home-monitoring, self testing, and interactive patient education

Group 1	67% partially implemented	33% considering implement in 3 yrs
Group 2	44% partially implemented	32% considering implement in 3 yrs
Group 3	42% no plans	27% part or full 27% considering in 3yrs

Summary:

Access to medical records, medical history, patient flow sheets, patient demographics, clinical guidelines, picture archiving and communication: Overall, the hospitals have either completed implementing IT systems to access information about or for patients or are in the process of implementing them. Size appears to influence speed of adoption. Group 1 hospitals are more likely to have fully implemented information technology these areas with the exception of patient flow sheets. In the areas of medical records and patient demographics, the hospitals in Group 2 hospitals are close to completing adoption. In the Group 3 hospital, information technology is most likely to be applied to access to medical histories and patient demographics and least likely to link patient care with patient guidelines and pathways.

Order entry of lab, radiology and pharmacy orders: These systems have been fully adopted by the majority of hospitals. Based on the responses, one could predict 100% hospitals in the group to have them operational in 3 years.

Results review of consultant, lab, radiology, radiology image and other tests: Group 1 hospitals have fully implemented IT in these areas. Only in Group 3, are there hospitals that are not planning to have all the report functions implemented in three years.

Patient support through home-monitoring, self testing, and interactive patient education: While all the Group 1 and 2 hospitals could be expected to have patient support systems up and running in three years, this cannot be said of hospitals in Group 3 as 42% of them have no plans for adopting the patient support systems listed.

EHR functions accessible in:

a. Hospital

Group I	100% fully implemented	
Group 2	95% part or fully implemented	5% considering implement in 3 yrs
Group 3	92% part or fully implemented	8% considering implement in 3 yrs

b. Emergency Department

Group I	100% fully implemented	
Group 2	100% part or fully implemented	
Group 3	92% part or fully implemented	8% considering implement in 3 yrs

No testing

c. Pharmacy

Group I	100% fully implemented	
Group 2	84% part or fully implemented	16% considering implement in 3 yrs
Group 3	89% part or fully implemented	11% considering implement in 3 yrs

No testing

d. Clinics – Onsite

Group I	100% part or fully implemented	
Group 2	90% part or fully implemented	10% no plans
Group 3	92% part or fully implemented	4% considering implement in 3 yrs

No hospital testing

e. Clinics – Offsite

Group I	100% part or fully implemented	
Group 2	84% part or fully implemented	10% no plans
Group 3	92% part or fully implemented	4% considering implement in 3 yrs

f. MD offices – Onsite

Group I	100% part or fully implemented	
Group 2	95% part or fully implemented	5% no plans
Group 3	92% part or fully implemented	4% considering implement in 3 yrs

g. MD offices – Offsite

Group I	100% part or fully implemented	
Group 2	90% part or fully implemented	10% no plans
Group 3	92% part or fully implemented	4% considering implement in 3 yrs

h. Other remote locations

Group I	100% part or fully implemented	
Group 2	89% part or fully implemented	11% no plans
Group 3	88% part or fully implemented	8% considering implement in 3 yrs

Summary: Hospital adoption of electronic health record technology appears to stimulate the records being available in all areas of the enterprise. Hospital, emergency department and pharmacy service records are

most likely to be linked electronically in all hospitals within three years. The Group 1 hospitals have already completed this process. Group 1 hospitals have either implemented electronic health records in the additional patient areas or are in the process of doing so. A small percentage of Group 2 hospitals have no plans to link patient records outside of hospital inpatient, emergency department and pharmacy services.

CPOE functions (Computerized Physician Order Entry: A computer-based system that automates and standardizes the clinical ordering process in order to eliminate illegible, incomplete and confusing orders. These systems often incorporate, or integrate with, decision support systems.

a. Access to current medical records

Group I	86% part or fully implemented	14% considering in 3 yrs
Group 2	68% part or fully implemented	26% considering in 3 yrs
Group 3	64% part or fully implemented	32% considering in 3 yrs

b. Access to patient flow sheets

Group I	86% part or fully implemented	14% considering in 3 yrs
Group 2	68% part or fully implemented	26% considering in 3 yrs
Group 3	61% part or fully implemented	30% considering in 3 yrs

c. Access to patient demographics

Group I	86% part or fully implemented	14% considering in 3 yrs
Group 2	58% part or fully implemented	37% considering in 3 yrs
Group 3	64% part or fully implemented	28% considering in 3 yrs

d. Real time Drug interaction alerts

Group I	71% part or fully implemented	29% considering in 3 yrs
Group 2	63% considering in 3 yrs	32% part or fully implemented
Group 3	56% considering in 3 yrs	20% part or fully implemented

Group 2 & 3—size affects adoption

e. Back end Drug interaction alerts

Group I	71% part or fully implemented	29% considering in 3 yrs
Group 2	68% considering in 3 yrs	26% part or fully implemented
Group 3	48% part or fully implemented	48% considering in 3 yrs

f. Order entry – Pharmacy

Group I	57% part or fully implemented	43% considering in 3 yrs
Group 2	79% considering in 3 yrs	16% part or fully implemented
Group 3	83% considering in 3 yrs	8 % fully implemented

Group 3 fully implemented not affected by system affiliation.

g. Order entry – Lab

Group I	57% part or fully implemented	43% considering in 3 yrs
Group 2	63% considering in 3 yrs	36% part or fully implemented
Group 3	76% considering in 3 yrs	16% part or fully implemented

h. Order entry – Radiology

Group I	57% part or fully implemented	43% considering in 3 yrs
Group 2	63% considering in 3 yrs	32% part or fully implemented
Group 3	76% considering in 3 yrs	16% part or fully implemented

i. Report review – Image review

Group 1	86% fully implemented	14% considering in 3 yrs
Group 2	55% part or fully implemented	26% considering in 3 yrs
Group 3	54% part or fully implemented	46% considering in 3 yrs

j. Results review – Consultant report

Group 1	86% part or fully implemented	14% considering in 3 yrs
Group 2	55% part or fully implemented	26% considering in 3 yrs
Group 3	56% part or fully implemented	40% considering in 3 yrs

k. Results review – Lab

Group 1	86% part or fully implemented	14% considering in 3 yrs
Group 2	61% part or fully implemented	16% considering in 3 yrs
Group 3	58% part or fully implemented	38% considering in 3 yrs

l. Results review – Other

Group 1	86% part or fully implemented	14% considering in 3 yrs
Group 2	47% considering in 3 yrs	41% part or fully implemented
Group 3	55% part or fully implemented	26% considering in 3 yrs

m. Patient support through home-monitoring, self-testing, and interactive patient education

Group 1	67% considering in 3 yrs	33% partially implemented
Group 2	77% considering in 3 yrs	18% no plans
Group 3	56% part or fully implemented	40% considering in 3 yrs

CPOE functions accessible in:**a. Hospital**

Group 1	71% part or fully implemented	29% considering in 3 yrs
Group 2	58% considering in 3 yrs	37% part or fully implemented
Group 3	67% considering in 3 yrs	25% part or fully implemented

Size affects adoption

b. Emergency Department

Group 1	71% fully implemented	29% considering in 3 yrs
Group 2	58% part or fully implemented	37% considering in 3 yrs
Group 3	44% part or fully implemented	36% considering in 3 yrs

c. Pharmacy

Group 1	71% fully implemented	29% considering in 3 yrs
Group 2	58% considering in 3 yrs	32% part or fully implemented
Group 3	78% considering in 3 yrs	17% part or fully implemented

d. Clinics-Onsite

Group 1	50% part or fully implemented	33% considering in 3 yrs
Group 2	53% considering in 3 yrs	16% no plans
Group 3	54% considering in 3 yrs	25% testing

e. Clinics-Offsite

Group 1	42% part or fully implemented	42% considering in 3 yrs
Group 2	59% considering in 3 yrs	27% testing
Group 3	52% considering in 3 yrs	26% testing

f. MD offices-Onsite

Group 1	57% part or fully implemented	29% considering in 3 yrs
Group 2	53% considering in 3 yrs	16% no plans
Group 3	54% considering in 3 yrs	25% testing

g. MD offices-Offsite

Group 1	42% part or fully implemented	42% considering in 3 yrs
Group 2	53% considering in 3 yrs	26% part or fully implemented
Group 3	54% considering in 3 yrs	25% testing

h. Other remote locations

Group 1	42% part or fully implemented	42% considering in 3 yrs
Group 2	58% considering in 3 yrs	16% no plans
Group 3	74% considering in 3 yrs	13% part or fully implemented

Summary: CPOE has received a lot of press in the lay and professional literature about its contribution to patient safety. Its adoption appears to be lag behind that of electronic health records. This may indicate that the organizations choose first to automate the care and tracking of inpatient and emergency room care, before turning to transforming the physician ordering process. The Group 1 hospitals are further along in CPOE adoption. For the most part, Group 2 and 3 hospitals are postponing adopting these systems for 3 years.

Do you have standalone IT systems in the following areas?

Note Group 3: 26% of cases (7 out of 27) did not respond. To maintain consistency and not overstate the presence of integrated stand alone systems, it was assumed that the non-respondents did not have stand alone IT systems and had not integrated them. If a hospital, with stand alone systems, has also integration those systems, the numbers in the two columns will be the same because the % is calculated against the total in the group. Example: Picture archiving for Group 1 and 3.

Catheterization Laboratory	Have stand alone IT	Yes—Have IT and it is Integrated
Group 1	100%	71%
Group 2	79%	53%
Group 3	37%	19%

Ambulatory Surgery Unit	Have stand alone IT	Yes—Have IT and it is Integrated
Group 1	43%	29%
Group 2	53%	26%
Group 3	37%	26%

Off-Site Ambulatory Care Unit	Have stand alone IT	Yes—Have IT and it is Integrated
Group 1	43%	29%
Group 2	44%	21%
Group 3	22%	22%

Critical/Intensive Care Unit	Have stand alone IT	Yes—Have IT and it is Integrated
Group I	43%	14%
Group 2	44%	21%
Group 3	15%	4%

Picture Archiving & Communications Unit	Have stand alone IT	Yes—Have IT and it is Integrated
Group I	100%	100%
Group 2	68%	66%
Group 3	44%	44%

Emergency Department	Have stand alone IT	Yes—Have IT and it is Integrated
Group I	43%	43%
Group 2	63%	58%
Group 3	59%	52%

Summary: Stand alone systems are neither plentiful nor uniformly integrated even among the larger hospitals. Stand alone systems are most likely to be found in the catheterization and picture archiving and communications units. They are also the areas most likely to have integrated their systems with others in the hospital. The Group 3 hospitals are most likely to have Emergency Department stand alone IT and for it to be integrated with other hospital systems.

Part III. Connectivity with others in the health care community

Does your hospital participate in any local/regional arrangements to share electronic patient specific health care information?

Group 1: 95% Share electronic patient specific health care information

Group 2: 84% Share electronic patient specific health care information

Group 3: 59% Share electronic patient specific health care information

Organizations Participating: To understand the implication of RHIOs, % is calculated for total number in the group rather than subsection. This was done to not overstate the degree of participation.

Share with private practice physician offices

Group I	57%
Group 2	47%
Group 3	37%

Share with Laboratories

Group I	43%
Group 2	21%
Group 3	19%

Share with Free-standing imaging centers

Group I	57%
Group 2	16%
Group 3	15%

Share with Retail pharmacies

Group I	14%
Group 2	21%
Group 3	26%

Share with Long-term care facilities

Group I	57%
Group 2	21%
Group 3	15%

Share with Public Health Department

Group I	43%
Group 2	37%
Group 3	15%

Share with School clinics

Group I	0
Group 2	0
Group 3	0

Share with Other hospitals

Group I	43%
Group 2	0
Group 3	22%

Share with Payers

Group I	43%
Group 2	32%
Group 3	22%

Share with Pharmacy Benefit Managers (PBM's)

Group I	14%
Group 2	0
Group 3	4%

Summary: Sharing of patient information is not uncommon outside a hospital but the entities with which information is shared vary by type of facility by size. The larger the hospital the more likely it is to report patient information sharing. No hospital shares information with a school clinic. Group I hospitals are most likely to share with the entities listed above with the exception of retail pharmacies. Group 2 and 3 hospitals are more likely to share with retail pharmacies than the largest facilities. Further investigation could determine if sharing is an effect of location or system ownership. The lack

of sharing among entities that influence type of care or payment may indicate where the options are for developing RHIOs. Private physicians, free standing image centers and long-term care facilities are most likely to have electronic access to hospital patient information.

What do you consider to be barriers to hospital IT adoption?

Initial cost of IT investment

Group 1	57% somewhat	29% not	4% significant
Group 2	58% somewhat	42% significant	
Group 3	56% significant barrier	30% somewhat	14% not

Ability to support ongoing costs of hardware and software

Group 1	72% somewhat	14% not	14% significant
Group 2	79% somewhat	16% significant	5% not
Group 3	62% somewhat	19% not	19% significant

Interoperability of hardware and software with current systems

Group 1	57% somewhat	29% significant	14% not
Group 2	58% somewhat	32% significant	10% not
Group 3	38% significant	31% not	31% somewhat

Inability of technologies to meet needs

Group 1	44% somewhat	28% not	28% significant
Group 2	63% somewhat	21% not	16% significant
Group 3	46% somewhat	35% not	19% significant

Availability of well-trained IT staff

Group 1	57% not	43% somewhat
Group 2	58% somewhat	42% not
Group 3	69% somewhat	31% not

Acceptance of technology by clinical staff

Group 1	57% not	28% somewhat	15% significant
Group 2	53% somewhat	26% not	21% significant
Group 3	58% somewhat	23% not	19% significant

Fear that technology will become obsolete too quickly

Group 1	86% not	14% somewhat	
Group 2	58% not	42% somewhat	
Group 3	50% not	39% somewhat	11% significant

Legal barriers to investment and development

Group 1	86% not	14% somewhat
Group 2	72% not	28% somewhat
Group 3	92% not	8% somewhat

HIPAA compliance

Group 1	57% not	43% somewhat
Group 2	58% not	42% somewhat
Group 3	62% not	38% somewhat

Summary: Cost and problems with interoperability are significant barriers for Group 3 hospitals. Three factors that do not hinder any hospital's adopting information technology are: fear of obsolescence, legal barriers, and HIPAA compliance. Over half of all the hospitals consider the ability to support ongoing costs of hardware and software somewhat problematic. The ability to hire well-trained IT staff while somewhat problematic is not a significant deterrent for any hospital. A small number of hospitals in each group consider clinician acceptance of technology as a significant barrier to its adoption.